their true nature I have not yet been able to decide; however, I think it probable some of the brown flakes are mica.

The result of my examination leads me to conclude that the dust is formed of material which was a glass wherein a porphyritic structure, on a large or a minute scale, was inconspicuous. This Matakava dust appears to agree generally with, though it differs varietally from, that described by Prof. Joly in NATURE (vol. xxxiv. p. 595), the main difference being that the biotite, which seems rather common in his samples, is rare in, if not absent from, the present one. I have not noticed sulphur, pyrite, or magnetite in a recognisable form.

It may be interesting to compare this dust with some samples projected from Cotopaxi, and described by myself (*Proc. Roy. Soc.* No. 231). These specimens came from various distances, ranging from twenty to sixty-five miles from the volcano. That which fell on the summit of Chimborazo (the most distant locality) consists of lapilli and chips; the majority of the grains range from about ·001 to ·003 inch; a very few only attain to a diameter of ·01 inch, and this is barely exceeded. In this dust, however, the lapilli are comparatively rare, the chips of glass and mineral dominating, with a fair proportion of the latter. A reference to the above paper will show the difference between this ash, that from Krakatão, and the above-described from New Zealand. This may be explained by the fact that a porphyritic structure is common in the lavas of Cotopaxi (as in the other summits of the district).

T. G. BONNEY

NOTES

WE have to record the death of General John Theophilus Beaulieu, F.R.S., at the age of eighty-one years. He entered the Indian Army in 1820 as a lieutenant in the Bengal Engineers, and was for some time Superintending Engineer in the Public Works Department for the N.W. Provinces. Among other services to science and to India, General Beaulieu inaugurated the system of magnetic observations in India, and was the author of a book of logarithms of wide reputation. General Beaulieu was elected a Fellow of the Royal Society fifty years ago, and has served on its Council.

THE death is announced, at Berlin, of Dr. A. Fischer, so long resident at Zanzibar, and who has done so much for the exploration of the Kilimanjaro region.

M. CHANCOURTOIS, General Inspector of Mines in France, author of several works on geology, and Professor in the School of Mines, has died suddenly at Paris at the age of sixty-seven.

THE following are the probable arrangements for the meetings of the Society of Arts before Christmas:—"November 24, William Anderson, M.Inst.C.E., "Purification of Water by Agitation with Iron and by Sand Filtration." December 1, adjourned discussion on the paper by Dr. C. Meymott Tidy, on "Sewage Disposal" (read April 14, 1886). December 8, Major-General C. E. Webber, R.E., C.B., "Glow-Lamps, their Use and Manufacture." December 15, J. B. Marsh, "Cameo-cutting as an Occupation." There will be five courses of Cantor Lectures during the session:—(1) "Principles and Practice of Ornamental Design," by Lewis Foreman Day. (2) "Diseases of Plants, with special reference to Agriculture and Forestry," by T. L. W. Thudichum, M.D. (3) "Building Materials," by W. Y. Dent, F.C.S., F.I.C. (4) "Machines for Testing Materials, especially Iron and Steel," by Prof. W. C. Unwin. (5) "The Structure of Textile Fibres," by Dr. Frederick H. Bowman, F.L.S., F.G.S. Two Juvenile Lectures on "Soap Bubbles," by A. W. Reinold, F.R.S., will be given on Wednesday evenings, January 5 and 12, 1887. The meetings of the Colonial Section and of the Indian Section will not commence till after Christmas.

THE General Committee of the Society for the Prevention of Hydrophobia and Reform of the Dog Laws held its fourth meeting on Friday last at the offices, 50, Leicester Square, London, W.C., to consider a programme which had been drafted by a sub-committee and circulated among members and supporters. Mr. Victor Horsley, B.S., F.R.S., Secretary to the Commission on Hydrophobia, attended this meeting by invitation, and was unanimously elected a Member of Committee. Many letters were read expressing approval of the programme and regretting that the writers were unable to attend. Among the gentlemen who thus wrote were Dr. Drysdale, Prof. Fleming, Dr. Norman Kerr, Prof. E. Ray Lankester, Mr. Arthur Nicols, and Prof. Pritchard. The Honorary Secretary having made a financial statement of a satisfactory nature, the Chairman, Colonel R. H. Rosser, briefly explained the care and time given by the sub-committee to the programme, which was then discussed in detail, and ordered to be printed with some additions and alterations.

IT is intended, in Section III. of the Manchester Jubilee Exhibition, to exhibit the historical and modern methods adopted in the several branches of electro-metallurgy, such as gold, silver, platinum, nickel and copper plating, the purification of metals by electrolysis, and generally to illustrate the connection between electricity and chemistry.

INFORMATION has been received by the Board of Trade respecting the oyster fisheries of the Isle of Wight. The oyster grounds and breeding ponds of the Isle of Wight are as follows:—(1) Medina River; (2) Brading Harbour; (3) Newtown; (4) Fishhouse or Fishbourne. In 1867 the Isle of Wight Oyster Fishery Company was started, having the Medina River and Newtown Creek for its grounds. This oyster fishery is said to have done well until 1871, when it was troubled by refuse and sewage discharged by mills at Newport, and a large quantity of the broods were destroyed. The Medina fishery is now for sale. About the year 1873 Major Boyle started a system for breeding oysters at Brading, but in 1876 the harbour works were commenced, and Major Boyle had to relinquish his ponds. The Harbour Board, however, still carry on the oyster breeding at Brading. They have six or seven ponds near St. Helens, which are estimated to contain five or six millions of oysters at the present time. As Brading is not suitable for fattening, the young oysters are sold to various growers to be laid down for one or two years to render them fit for food. Newtown Creek is the best fattening ground in the Isle of Wight, but the fishery company is now in liquidation through want of funds, and the business is in abeyance. At Fishhouse there has been a good fall of spat this last summer, but the ground is much disturbed by barges, which prevents the fishery from being fully developed. The oyster fishery is consequently not very prosperous. The creek, it may be mentioned, was recently cleared, and some sixty or seventy thousand oysters were transferred to Newtown to fatten in a pond placed at their disposal by the Newtown Company. Besides the oyster fishery companies above referred to, there are several fishermen who dredge for oysters at sea in the Solent, and particularly in Osborne Bay. The oysters dredged up are seldom fit for the market, and have usually been sold to one of the companies to be laid down and fattened.

IN Dr. B. W. Richardson's recent Cantor Lectures on "Animal Mechanics," speaking of the mechanism of the heart, he described the number of the pulsations of the heart in different animals—in fish, frog, bird, rabbit, cat, dog, sheep, horse—and made a few comments on the remarkable slowness of the heart—40 strokes per minute—in the horse. Then the number of pulsations in man at various periods of life, and at different levels, from the level of the sea up to 4000 feet above sea-level, was brought under review, and was followed by a computation of the average work performed by the heart in a healthy adult man. The work was traced out by the minute, the hour, and the day, and was shown to equal the feat of raising 5 tons 4 cwt. one foot per hour, or 125 tons in twenty-four hours. The excess of this work under alcohol in varying quantities formed a corollary to the history of the work of the heart, Parkes's calculation showing an excess of 24 foot-tons from the imbibition of eight fluid ounces of alcohol. The facts relating to the work of the heart by the weight of work accomplished was supplemented by a new calculation, in which the course of calculation was explained by mileage. Presuming that the blood was thrown out of the heart at each pulsation in the proportion of 69 strokes per minute, and at the assumed force of 9 feet, the mileage of the blood through the body might be taken at 207 yards per minute, 7 miles per hour, 168 miles per day, 61,320 miles per year, or 5,150,880 miles in a lifetime of eighty-four years. The number of *beats* of the heart in the same long life would reach the grand total of 2,869,776,000.

A METEOR of unusual splendour was seen from the Oxford Road, Banbury, on Tuesday, November 2, at about 8.5 p.m. The fall became visible at about mid-distance between zenith and horizon in a direction west by north. At first the meteor burned with a faint, apparently reddish, light, but when a third of its path had been passed, it burst into an intense blue flame, and, increasing in brilliancy during the next third of its course, it finally died away before reaching the horizon, leaving behind it a long red trail distinguishable for several seconds afterwards. The fall was at an angle of 60°, and during the middle third of the flight the flame was of such intensity as to light up the surrounding country.

REFERRING to a paper at the Paris Geographical Society by Dr. Hamy on "The Interpretation of one of the Monuments at Copan, Honduras," in which an inference is drawn as to early Chinese intercourse with America, Dr. W. H. Dall, writing to *Science*, states his belief that the very wide hypothesis thus broached, and which in one form or another has had a certain currency for more than a century, rests upon a totally insufficient foundation. That wrecked Japanese, and possibly Chinese, from time to time were cast on the shores of America, is beyond question. But there is every reason to believe that the wrecked people were (1) nearly always males, and incapable of colonising; (2) were either killed or enslaved by the Americans in accordance with a general usage; and (3) that neither in arts nor language have they left any appreciable trace on American anthropology. "The statement of Brooks, that the Japanese and Aleuts could communicate without an interpreter, is true to this extent. I was present when the aforesaid Japanese, three males, were brought to the port of Unalashka, and took pains to inquire into the assertion which was made to me at the time. I found that the communications were wholly by signs, and not by spoken language, as the Aleuts could not understand a word of Japanese without its accompanying signs. Secondly, Brooks, who was long Consul in Japan, informed me that he had particularly searched into the matter of the voyage to Fu-sang, and that he had conclusive evidence that the voyage which actually took place was to the well-known and still existing province of Fusang in Korea (see Griffis' work), and had no connection whatever with America. Lastly, the mere presence of two simple curved lines on a circular stone, taken by itself, proves nothing as to their meaning, and still less that they had any connection with the Chinese symbol." Dr. Dall concludes by stating that such unbridled hypotheses are the "curse of anthropology."

WE have received a fresh instalment of the very valuable work emanating from the firm of Eduard Trewendt, Breslau, the now well-known "Encyclopædia of Natural Sciences," namely, Nos. 48 and 49 of the first part, and 37 and 38 of the second part. These four numbers deal with three different branches of science. No. 48 of the first part is botanical, a continuation of Drude's masterly work, "Systematic and Geographical Arrangement of the Phanerogams," copiously illustrated with woodcuts, as was the earlier portion of the same publication. No. 49 of the "Alphabetical Manual of Zoology, Anthropology, and Ethnology," takes the reader from "Landschaf" to "Lithodina." Of the abundant material embraced in this compass may be particularly mentioned "Landschnecken," by E. von Martens; "Larven," by Dr. Griesbach; two especially interesting contributions, "Larynx," by von Mojsisovics, and "La Tène-Zeit," by Mehlis; treatises by Jaeger on "Life, and its Conditions, Phenomena, and Stimulations, &c.," as also "Linsen," and "Lippen," by Dewitz. Nos. 18 and 19 of the second part belong to the "Alphabetical Manual of Chemistry," containing the papers—Furfurangruppe (conclusion), Gährung, Galle, Gallium, Gehirn, Gerberei, Gerbsäuren or Gerbstoffe, Germanium, Glas, Glycerin, Glycidsäuren, Glycocoll, Glycoside. As of most general interest in this list of articles may be specially cited "Glycoside," by Prof. Oskar Jacobsen, of which the firm is preparing a separate impression; as also "Gährung," by Tollens; and "Glas," by Engler. The newly-discovered "Germanium" is treated by the editor, Herr Ladenburg himself. In Prof. Liebrich's contribution, "Gehirn," we have a valuable paper on this subject by a recognised authority.

TWO remarkable specimens of deformed fish were taken from a rearing-pond at Delaford this week, and brought to the South Kensington Aquarium. One is a trout about three years old, whose tail is bent to such an extreme that it stands at right angles with the body of the fish. Its mode of progress is laboured, and its appearance is very peculiar. The other specimen is an ordinary stickleback, measuring 4 inches in length, whose body is swollen through dropsy to the extent of 1 inch in diameter. At first sight its appearance is similar to a young mouse, and it requires close inspection to grasp the fact that it is a fish. It moves very slowly, with great expenditure of force, the weight of the contorted body being considerable.

THERE has been a great demand for the German carp lately imported into this country by the Marquess of Exeter and others for the purpose of acclimatisation in this country, and a numerously expressed desire to stock waters that are useless for the purpose of maintaining other fish than carp has been made for the German species.

THE operations in connection with the new Observatory and Marine Fish-Culture Station at Lochbuie, Isle of Mull, to be established under the auspices of the National Fish-Culture Association, are to be commenced forthwith. At a meeting of the Council, held last week, it was arranged to form ponds for the propagation of lobsters, and to make certain observations upon marine fauna. The details of the scheme were placed in the hands of a special scientific committee.

WE have received from Messrs. Horne, Thornthwaite, and Wood, opticians, a map of the moon, 12 inches in diameter, mounted on good stout cardboard, represented as she appears when viewed through a telescope with an astronomical eyepiece. This will be a very useful companion and guide for those amateurs who are studying the lunar surface; it can be conveniently held in the hand while observations are being made. About 300 craters and walled plains are marked very clearly, and the names of the different seas are given in larger letters. At the back is added a short description of some of the chief features.

A SHOCK of earthquake was felt in the district of Beira Alta on the 11th inst.

THE additions to the Zoological Society's Gardens during the past week include a Patas Monkey (*Cercopithecus patas*), from West Africa, presented by Mr. Thomas Baily; a Yellow Baboon (*Cynocephalus babouin*), from West Africa, presented by Capt. J. Henderson Smith, R.A.; two Goshawks (*Astur palumbarius*), European, presented by the Baron d'Epremesnil; a Hobby (*Falco subbuteo*), caught in the Indian Ocean, presented by Dr. Rivis Mead; two Java Sparrows (*Padda oryzivora*) from Java, four St. Helena Seed-Eaters (*Crithagra butyracea*), from South Africa, presented by Mrs. Conrad Pile; two Sing-sing Antelopes (*Cobus sing-sing* ♂ ♀), from West Africa, received in exchange; a Woodcock (*Scolopax rusticula*), European, purchased; an Ocelot (*Felis pardalis*) from America, a Bactrian Camel (*Camelus bactrianus* ♀) from Central Asia, two White-backed Piping Crows (*Gymnorhina leuconota*) from South Australia; a Banded Parrakeet (*Palæornis fasciatus* ♂), from India, deposited; a Vinaceous Turtle Dove (*Turtus vinaceus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE INFLUENCE OF ASTIGMATISM IN THE EYE ON ASTRONOMICAL OBSERVATIONS.—Prof. Seeliger has published, in the *Abhandlungen der k. bayer Akademie der Wiss.*, ii. Cl., xv. Bd., 3 Abth., an interesting paper on this subject. The paper is divided into four sections. The first part treats of certain details connected with the refraction of light which are used in the subsequent investigations. The second part gives the theory of the formation of images in an astigmatic eye, and its application to measures made with an altitude instrument. In the third and fourth parts the author treats of the application of his theory to the heliometer and wire-micrometer respectively. It appears, from Prof. Seeliger's researches, that this malformation in the eye, which is far from uncommon, exerts a larger influence on astronomical measurements than is commonly supposed. Thus, he shows that a systematic error in a series of observed declinations amounting to 0″·26 may very well be due to it. And it appears that the discordances in observed position-angles of double stars, depending on the inclination of the line joining the components to the vertical, with which the measures of some observers are affected, may in part be referred to the same cause. Prof. Seeliger's paper is one which may be profitably studied by those who aspire to the attainment of greater accuracy in astronomical observations.

THE KALOCSA OBSERVATORY.—Dr. C. Braun has recently published a report of this Observatory, founded by Cardinal Haynald, Archbishop of Kalocsa. The equipment of the Observatory consists of a refractor, by Merz, of 7 inches aperture; another of 4 inches; a transit by Cooke, aperture 2·3 inches; an altazimuth by Breithaupt, of Cassel; a chronograph, three clocks, and a chronometer; several spectroscopes, of which a large solar spectroscope with automatic adjustment to minimum deviation is the principal; a star photometer by Zöllner, and a spectro photometer by Vogel and Glan. The two most important works effected at the Observatory have been the determination of the geographical position of the Observatory, and the observation of sunspots. A special value attaches to the former, as hitherto the position of no place in Hungary had been fixed by direct astronomical methods. The latitude of the standard pillar of the Observatory was determined by geodetic observations to be 46° 31′ 41″·92; the astronomical methods made it 0″·07 greater. The longitude was found to be 1h. 15m. 54·343s. east of Greenwich. The observations of sunspots extend from May 14, 1880, to January 31, 1884, and form a useful record of an interesting period. The method of projection was employed in observing; the observations were reduced first by means of a projection of the sun, and secondly by calculation. In the latter method Dr. Braun employed an instrument of his own device, which he terms a trigonometer, for the direct solution of spherical triangles. From his observations Dr. Braun deduces the following expression for the velocity of rotation:—$865^\circ{\cdot}33 - 209^\circ{\cdot}86 \sin^2 \lambda$. He also shows the downward tendency in latitude of the mean spotted area, and points out the curious partial effort at recovery which shows itself at tolerably regular intervals. The observations of each rotation are grouped together and given in short tables, and diagrams similar to Carrington's, showing the spots of each rotation in shape and position, are also added. The volume concludes with full descriptions of a number of ingenious instrumental devices, some actually employed at Kalocsa, others still only projected. Amongst these is an ingenious transit micrometer for eliminating personal equation in the observation of transits.

ζ CASSIOPEIÆ.—The *Sidereal Messenger* reports, on the authority of Prof. Colbert of Chicago, that this star appeared to increase its brilliancy by quite half a magnitude on the night of August 20. The most remarkable point of the observation was the shortness of duration of the phenomenon: for, about half an hour after it was first noticed, the star began to return to its normal magnitude. It will be interesting to learn if the change was observed elsewhere.

NEW MINOR PLANETS.—Prof. Peters discovered a new minor planet, No. 261, on October 31, and Herr Palisa two—Nos. 262 and 263—on November 3.

COMET FINLAY.—The following ephemeris for Berlin midnight is in continuation of that given in NATURE for November 4 (p. 17):—

1886	R.A. h. m. s.	Decl. ° ′	log *r*	log Δ
Nov. 16	19 59 51	23 22·7 S.	0·0697	0·0899
18	20 8 42	22 53·7		
20	20 17 38	22 22·4	0·0689	0·0874
22	20 26 37	21 48·8		
24	20 35 39	21 13·0 S.	0·0693	0·0856

COMET BARNARD.—The following ephemeris for Berlin midnight is given by Dr. E. Lamp (*Astr. Nachr.*, No. 2753):—

1886	R.A. h. m. s.	Decl. ° ′	log *r*	log Δ	Brightness
Nov. 18	13 16 59	13 12·4 N.	9·9433	0·0637	10·8
20	13 31 51	14 5·9	9·9306	0·0485	12·3
22	13 47 57	14 58·3	9·9180	0·0340	13·9
24	14 5 20	15 47·7	9·9055	0·0207	15·7
26	14 24 2	16 32·5	9·8934	0·0089	17·5
28	14 43 57	17 10·3	9·8817	9·9990	19·3

The brightness at the time of discovery is taken as unity.

GOULD'S "ASTRONOMICAL JOURNAL."—The first number of the new issue of this journal appeared on November 2. It contains the following papers:—On the light-variations of Sawyer's variable in Vulpecula, by S. C. Chandler, Jun., in which the elements of the star are given as Max. = 1885 Nov. 2d. 20h. 35m. G.M.T + (4d. 10h. 29·0m.) E. The minimum is 1·060d. earlier. The rapidity of the rise is a striking characteristic of this star.—A new short-period variable, by E. F. Sawyer. The star, 57 Sagittarii, has a period of not more than 6 days; the variation is from 5·6 mag. to 6·6. Place for 1875·0, R.A. 18h. 14m. 2s.; Decl. 18° 54′·8.—Elements and ephemerides and observations of Comets Finlay and Barnard, by Profs. Winlock, Boss, and Frisby.—Observations of U Ophiuchi, by E. F. Sawyer; and the first part of a paper on the lunar theory, by Prof. Stockwell.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 *NOVEMBER* 21–27

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on November 21

Sun rises, 7h. 31m.; souths, 11h. 46m. 3·1s.; sets, 16h. 1m.; decl. on meridian, 19° 58′ S.: Sidereal Time at Sunset, 20h. 3m.

Moon (New on November 25) rises, 1h. 37m.; souths, 8h. 4m.; sets, 14h. 18m.; decl. on meridian, 1° 57′ N.

Planet		Rises h. m.		Souths h. m.		Sets h. m.		Decl. on meridian ° ′
Mercury	...	9 30	...	13 11	...	16 52	...	25 2 S.
Venus ...	...	7 12	...	11 35	...	15 58	...	18 46 S.
Mars ...	...	10 33	...	14 18	...	18 3	...	24 32 S.
Jupiter...	...	4 15	...	9 34	...	14 53	...	8 45 S.
Saturn...	...	19 34*	...	3 36	...	11 38	...	21 22 N.

* Indicates that the rising is that of the preceding evening.